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Polymers Used in Medicine: Common Types and Benefits of Drug Delivery Systems

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Polymers Used in Medicine
Common Types and Benefits of Drug Delivery Systems

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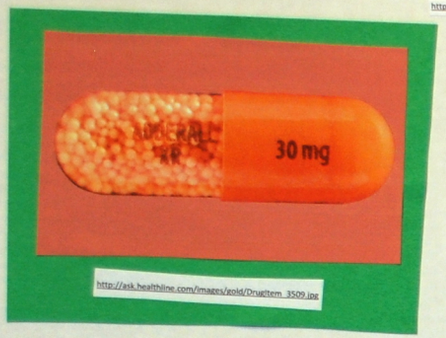

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Introduction

Polymers are found in every facet of life, they make up many of the items and products that people use on a daily basis. Polymers can be either natural or synthetic, and are used to make up everything from plastics, fabrics, contact lenses, disposable diapers, construction materials, and many different types of medical applications as well. Polymers used in medicine have great potential and various applications, including: surgical devices, implants and prosthetic devices, tissue replacement (mesh implants), and drug delivery systems.

Types of polymers used in medications can be genetically engineered, protein-based, or synthetically engineered. Both natural and synthetic polymers can be used for varying types of drug delivery, such as hydrogels, microcapsules and nanoparticles. Which type of polymer is best depends on the target of the medication and its overall desired effect.

(1, 5)

Versatab


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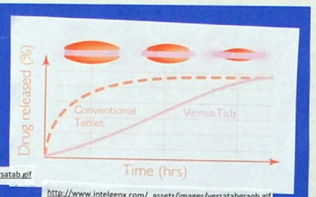

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Versatab technology, the same idea behind multi-layered tablet design, allows the medication to be protected by outer polymeric layers that slowly dissolve away first before the inner layer. This delay in degradation of the inner layer allows for the medication to reach specific target sites in the body without being degraded first, such as in the acidic conditions of the stomach.

This type of tablet design also allows for a more controlled and extended release of the tablet at a more consistent rate. Traditional tablets often reach their peak performance relatively quick and must be taken more frequently in order to maintain the same effectiveness. Extended-release mechanisms such as multi-layered tablets can last 8, 12 or even 24 hours with one dose. (6)

Drug Delivery Techniques

Multi-layered tablets—contain 2-3 layers of medication, 1-2 layers contain easily digested and the protected layer can then be digested later, polymers are what control all layers of this mechanism.

Enteric coating—this type of tablet contains a specialized coating of polymers that allows the medication to stay intact until it reaches a point later on in digestion, aspirin is a medication that is often preferred with an enteric coating, so that it doesn't upset the stomach and can then be digested in the intestinal tract.

Polymer encapsulated pellets—this technique can come in many forms, the most commonly recognized of this form is the capsule containing dozens of small pellets. The outer capsule is composed of polymers and allows the medicated pellets to sustain digestion until their desired release point. The other common form comes as a tablet that is pierced with a whole that allows digestive enzymes in to break down the pellets within the tablet, but at a much more controlled rate than a regular tablet. This type of encapsulation is much harder to break down than the standard gelatin like capsule.

(2, 4, 5, 6)

Conclusion

Polymeric medications are critical for efficacy and safety of delivery of many types of medications. Polymers are vital in controlling toxicity of medications; they are able to respond to certain stimuli in the human body such as temperature, pH levels and ionic compositions in order to make sure that the medication is performing at optimal levels. Ability of smart polymers to react to changing stimuli means that patients are less likely to experience adverse reactions to certain types of medications.

The use of polymers in medication therapy has come a long way since polymers first started to be used in medications, but there is still very much that can be learned from continued experimentation. The idea that certain side effects and adverse reactions can be avoided with a little polymer engineering is both exciting and has potentially endless possibilities for medications yet to be developed.

(2, 3)


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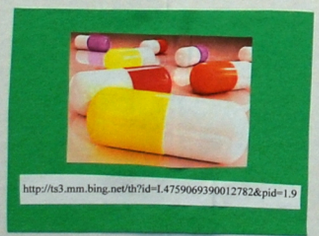
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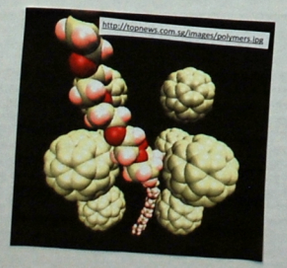
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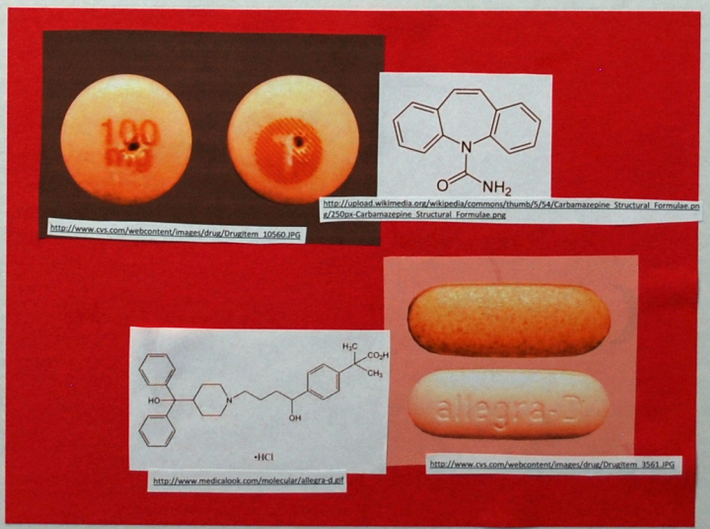

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